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Williston and Dinosaur Reservoirs Raptor Survey 1995: Survey 1, Raptor Nest Locations

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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Williston and Dinosaur Reservoirs Raptor Survey 1995:

Survey 1, Raptor Nest Locations.

This report was prepared for the Resource Inventory Committee (RIC), BC Environment, Victoria, B.C. The Peace/Williston Compensation Program conducted the first of three raptor nest surveys in the Williston and Dinosaur Reservoirs in March 1995. These surveys are part of a long-term project to inventory, protect, and enhance raptor populations in the Reservoirs' areas. The objective of this report was to evaluate and provide comments on the draft RIC manual "Survey Methods for Raptors in British Columbia", with respect to the first raptor nest survey.

INTRODUCTION

In February 1995, the Peace/Williston Compensation Program initiated a raptor project on the Williston and Dinosaur Reservoirs. The objectives of this project are to determine the population status of bald eagles and ospreys along the shoreline perimeter of the two reservoirs, and to identify enhancement opportunities. When the impoundment of the upper Peace and lower Parsnip and Finlay Rivers occurred, forested lands not previously harvested were flooded. As a result, a number of snags were created along the shoreline which will eventually decay and fall. This situation could lead to a shortage of prime nesting habitat for these fish-eating raptors and other cavity-nesting bird species in the area.

Three different surveys will be conducted in 1995: the first survey is the subject of this report. The objectives of this first survey were to identify and record existing raptor nest locations within the shoreline perimeters of the reservoirs, and to identify potential nesting site areas. In early June, the known nest locations will be surveyed, and the number and species of the breeding pairs determined. The third survey will be conducted in July, and will entail counting the number of fledglings per occupied nesting site. The results from these surveys will contribute to protecting valuable nesting habitat in the area.

The Peace/Williston Compensation Program (PWCP) was initiated in 1988 to enhance and protect fish and wildlife resources affected by the creation of the Williston Reservoir in north central B.C. The Program is a joint initiative of BC Hydro and BC Environment, with funding provided by BC Hydro.

STUDY AREA

The study area covered the entire perimeter of the Williston and Dinosaur Reservoirs, and the adjacent forested shoreline (Figure 1). Williston Reservoir is located in north central British Columbia between 55 and 57 degrees north latitude and 122 and 126 degrees west longitude. The extensive drainage area includes several major river systems including the Carbon, Clearwater, Finlay, Ingenika, Manson, Nabeshe, Nation, Omineca, Ospika, and Parsnip, Rivers. The reservoir has a shoreline perimeter of about 1,770 km with a surface area of 177,870 ha at the maximum reservoir elevation of 672 metres (B.C. Hydro, 1988).

Dinosaur Reservoir is located at the east end of the Peace Reach of Williston Reservoir, between the W.A.C. Bennett Dam and the Peace Canyon Dam on the Peace River. This smaller reservoir has a shoreline perimeter of 54 km and a surface area of 945 ha (Water Management Branch, 1984).

The Williston and Dinosaur Reservoirs are surrounded by two different biogeoclimatic zones, the Sub-Boreal Spruce (SBS) zone and the Boreal White and Black Spruce (BWBS) zone. The SBS zone is located along the entire perimeter of the two reservoirs except for the north end of the Finlay Reach and the east end of the Peace Reach which lie in the BWBS

Figure 1. Location of study area.

zone. The most common tree species along the shoreline of the reservoir include lodgepole pine (*Pinus contorta*), spruce (*Picea* sp), trembling aspen (*Populus tremuloides*), black cottonwood (*Populus trichocarpa*), and paper birch (*Betula papyrifera*).

METHODS

The raptor nest survey was conducted on February 28, March 1, and March 2, 1995, during sunny weather conditions. Daily surveys commenced at least two hours after sunrise, and ended about one hour before dark.

The entire perimeter of the Williston and Dinosaur Reservoirs were surveyed so that all nests and potential nesting sites for bald eagles and ospreys could be identified. For survey purposes, the Williston Reservoir was divided into three equal sized areas based on the location of re-fueling stations. Each area was estimated to take one eight hour day to survey. Flight routes were planned prior to surveying to sample the shoreline through the most economical route.

A Bell 206 Jet Ranger III helicopter was used to survey the reservoirs. While in flight, maps were used to ensure the entire shoreline was surveyed. Any large creeks or rivers entering the reservoir were surveyed approximately 1 km upstream from the mouth. The survey was conducted between 50 and 80 meters above the ground at speeds ranging from 130 to 160 km/hr (ground speed) depending on shoreline habitat. Faster speeds were used to survey areas having steep cliffs, banks, dense lodgepole pine stands or clearcuts, while areas with numerous aspens and cottonwoods were flown slower. When snags were present in the water, the actual shoreline was flown. When no snags were in the reservoir, the helicopter would fly inland about 25 to 50 meters so all crew members could observe upcoming nests. The pilot also assisted the surveyors in searching for the nests.

A three person crew was used to collect the nest and snag data. One member was responsible for taking a photo of the nest and surrounding area. A second member recorded data such as number of snags and nests on the shoreline (inundated zone), number of nests and tree species on the foreshore (forest zone), and any comments about the nest or snag (see data form in Appendix 1). The third member was responsible for navigation and the recording of the UTM locations for all nests and snag areas. Once a nest was spotted, the pilot would turn the helicopter around and hover near the nest so a photo of the nest and surrounding area could be taken. Finally, the pilot would hover directly over the top of the nest so a UTM location could be recorded. This procedure was repeated for each nest location.

RESULTS

Nesting Sites Identified

One hundred and eighty (180) nests were located along the foreshore and shoreline of the Williston and Dinosaur Reservoirs (Table 1). Dead snags (105) were the main nest site locations for raptors, while cottonwood trees (39) were the next highest site selected for nest locations. Aspen trees totaled 31 nest site locations. Williston Reservoir contained 175 nests while only five nests were located in Dinosaur Reservoir. More of the nests in the Williston Reservoir were found in snags along the shoreline areas (54%), opposed to 46% of the nests which were located in the trees along the foreshore. Raptor nests in Dinosaur Reservoir were in either live aspen or cottonwood trees.

The Finlay Reach contained the most nest locations (86). The Parsnip Reach had 80 nest sites while the Peace Reach had only nine nesting sites. The highest concentration of nests (39) was located in the Manson Arm of the Parsnip Reach. Of these nests, 95% were on snags located within the inundation zone of the reservoir.

Cost Analysis

Three full days were needed to fly the perimeter (1,825 km) of Williston and Dinosaur Reservoirs. A total of 15.5 hours of air time was used at a cost of $10,838. The helicopter cost averaged $5.94 per km of shoreline. In addition, nine working days were required by program staff to complete the field part of the survey.

DISCUSSION

Survey Design

Conducting a total count survey provided us with the comprehensive information we needed to accomplish our objectives. A total count survey enabled us to identify the total number of nests on the shoreline of the reservoirs, and locate potential nesting sites. Sampling type surveys would not have provided us with the information we required. For example, stratified random sampling requires a knowledge of distribution and density of raptors in an area. This information is not available as no formal surveys have ever been previously completed on the reservoirs. Line transects require that at least 40 raptors must be observed during the transect in order to develop a reliable detection function (Krebs, 1989). This method would also rely on previous knowledge of raptor numbers located throughout the reservoirs.

Total count surveys appear to be quite expensive. Although the initial survey required us to fly the entire shoreline, the next two surveys will not require as much effort or monies. All nest sightings have been recorded with UTM locations, which can be entered into the helicopters' GPS unit for returning to the nests on the second and third surveys.

TABLE 1. RAPTOR NEST LOCATIONS BY SITE

AREA	# of NESTS in COTTONWOODS	# of NESTS in ASPENS	# of NESTS in PINE	# of NESTS in SPRUCE	# of NESTS in SNAGS		TOTAL # of NESTS
					FORESHORE	SHORELINE	
Finlay Reach Area	7	15	1	1	10	28	62
Omineca Arm	5	2	0	0	0	10	17
Ingenika Arm	1	0	0	0	0	0	1
Ospika Arm	5	0	0	1	0	0	6
Entire Finlay Reach	18	17	1	2	10	38	86
Parsnip Reach Area	12	6	1	1	0	18	38
Manson Arm	2	0	0	0	0	37	39
Nation Arm	2	0	0	0	0	1	3
Entire Parsnip Reach	16	6	1	1	0	56	80
Entire Peace Reach	3	5	0	0	0	1	9
Williston Reservoir	37	28	2	3	10	95	175
Dinosaur Reservoir	2	3	0	0	0	0	5
Both Reservoirs	39	31	2	3	10	95	180

This way, our surveys can be focused on known nest sites. Therefore, we expect that there will be a cost savings for the next two inventories.

Survey Timing

The timing of the first survey to identify nest locations met with our objectives. The beginning of March was selected because the deciduous trees do not have leaves at this time of year, yet there is still snow in the nests which helps to make them more visible. Generally, snow does not accumulate on aspens, cottonwoods, and snags. Since snow collects on the larger nests in these trees, our chances of spotting the nests from the air was improved. Any attempted surveys earlier in the year would probably experience poor weather conditions due to continued snowfall in the Williston Watershed. In addition, there would be more snow on the trees making the nests less obvious.

Later surveys would prove to be more difficult. Nest visibility would decrease as the leaves would be present on the deciduous trees, and helicopter speeds would have to decrease since more effort would be required to spot the nests. Combining the nest location survey with the June occupancy survey would prove to be more disturbing to the raptors, and more hazardous for the survey crew. The presence of a helicopter would upset the raptors, thus the pilot would have to be extra careful. During the second survey, only the identification of bird species on the nest will be required. Therefore, the helicopter can stay back from the nest and not disturb the incubating parents.

Helicopter versus Fixed Wing

Aerial transportation was chosen for this survey due to the large size of the survey area. Ground access by truck or snowmobile to the shoreline would be extremely difficult and very labor intensive. The shoreline perimeter could have been surveyed by boat after ice break-up on the reservoirs, although visibility and timing would have been poor.

The use of a helicopter proved to be ideal for surveying raptor nests. Bubble windows in the rear of the helicopter helped to increase observer visibility. Once a nest was spotted, the helicopter would turn around. The ability to hover near the nest allowed the photographer to take a still photo of the nest and surrounding area. Recording the nest location was quick. The maneuverability of the helicopter flying over the top of the nest provided an exact GPS location. With the use of the photos and the known nest locations, finding the nests for the next two surveys should prove to be quite simple.

Fixed-wing planes do not have the same maneuverability as helicopters. Wide, long turns are required for planes to turn around. Once a nest was spotted, the plane would have to make at least two passes over the nest to collect the necessary data. In the first pass, photos of the nest would probably be out of focus and not provide as much detail of the surrounding area. During the second pass, the chances of flying exactly over the nest to get a UTM

location would prove to be complex. The visibility from planes tend to be poor, unless the aircraft is fitted with bubble windows like a helicopter. Surveying cliff and canyon areas on the reservoirs was not a problem for the helicopter whereas it might be for a plane. As the Williston Reservoir has many small bays and islands it would also be labour intensive to survey from a plane.

Another major advantage to using a helicopter is greater availability of refueling and landing sites. In addition, observer "comfort" is usually much better in a helicopter for extended periods of time than in a plane.

The RIC Manual for Raptor Survey Methods

The manual appears to provide sufficient details and explanations with respect to conducting actual bird surveys. The methodology explained in the manual will be useful for conducting the next two Williston Reservoir raptor surveys: the nest occupancy and fledgling success surveys. However, the manual should provide more details with respect to conducting nest location surveys. A table identifying the best time periods to survey nests and raptors in different parts of the province would also be helpful.

LITERATURE CITED

BC Environment, 1984. Map of Dinosaur Lake; Inventory Operations Unit. Water Management Branch.

BC Hydro, 1988. Williston Reservoir Raising. Environmental Overview. Report No. ES-118. Environmental Services Systems Operations and Maintenance Division.

Krebs, C.J. 1989. Ecological Monographs. Harper Collins Publishers. New York, N.Y.

APPENDIX 1: RAPTOR NEST SURVEY DATA FORMS

RESERVOIR RAPTOR PROJECT

SNAG/NEST SURVEY

Page ___ of ___

Date: _____ Observers: _____

Method: _____ Start time: _____ End time: _____

Comments: _____

No.	Shoreline		Foreshore		Photo No.	Comments
	# snags	# nests	# nests	tree sp.		

RESERVOIR RAPTOR PROJECT

SNAG/NEST SURVEY (GPS locations)

Date: _____ Recorder: _____

No.	Fix #	Lat/Long		UTM		Comments